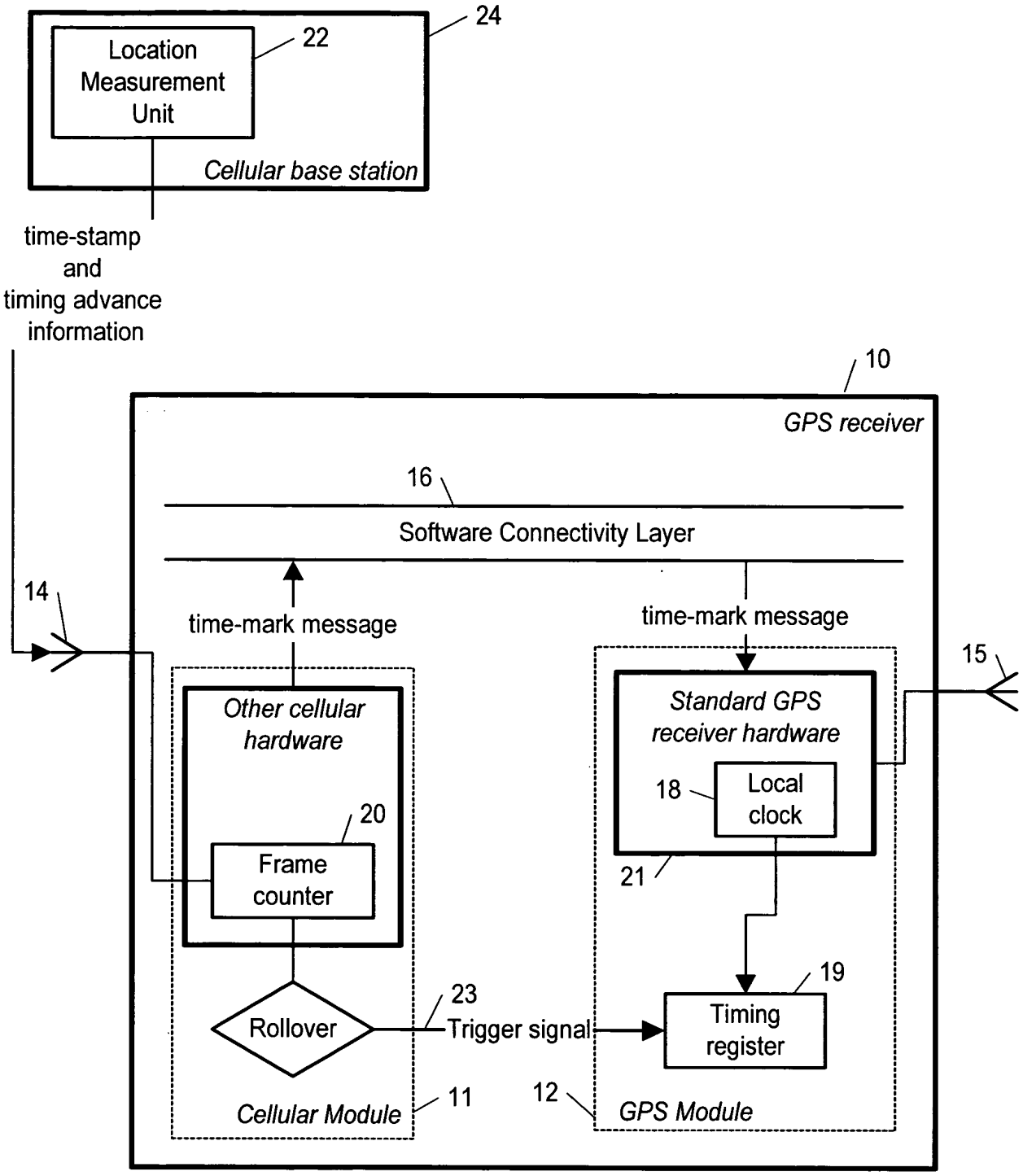
Location Measurement Unit
22
24
Cellular base station
time-stamp and timing advance information
10
GPS receiver
16
Software Connectivity Layer
14
time-mark message
time-mark message
15
Other cellular hardware
20
Frame counter
Standard GPS receiver hardware
18
Local clock
21
19
Timing register
23
Rollover
Trigger signal
Cellular Module
11
12
GPS Module

FIG. 1

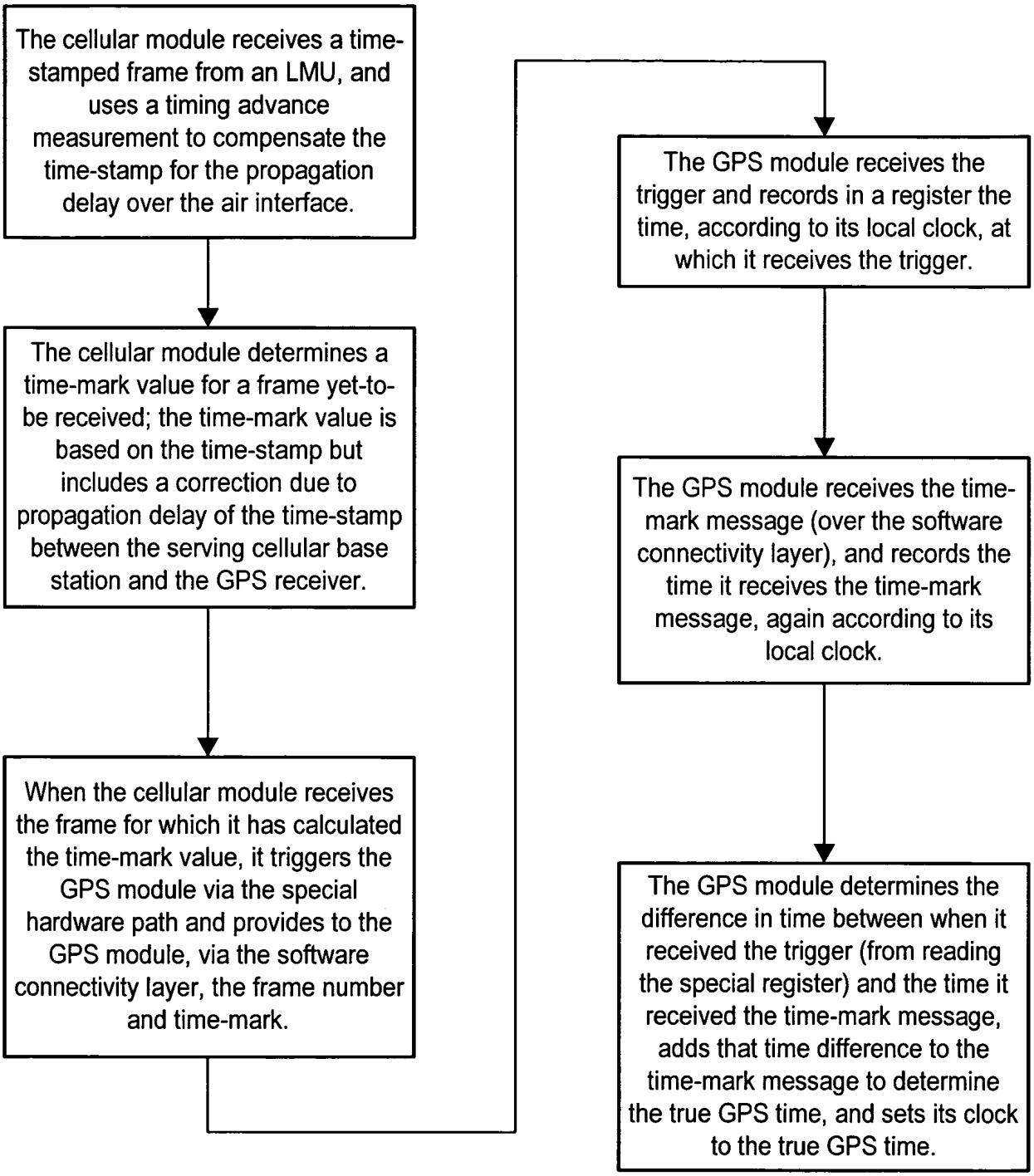
The cellular module receives a time-stamped frame from an LMU, and uses a timing advance measurement to compensate the time-stamp for the propagation delay over the air interface.
The cellular module determines a time-mark value for a frame yet-to-be received; the time-mark value is based on the time-stamp but includes a correction due to propagation delay of the time-stamp between the serving cellular base station and the GPS receiver.
When the cellular module receives the frame for which it has calculated the time-mark value, it triggers the GPS module via the special hardware path and provides to the GPS module, via the software connectivity layer, the frame number and time-mark.
The GPS module receives the trigger and records in a register the time, according to its local clock, at which it receives the trigger.
The GPS module receives the time-mark message (over the software connectivity layer), and records the time it receives the time-mark message, again according to its local clock.
The GPS module determines the difference in time between when it received the trigger (from reading the special register) and the time it received the time-mark message, adds that time difference to the time-mark message to determine the true GPS time, and sets its clock to the true GPS time.

FIG. 2